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MORGAN, LEWIS & BOCKIUS, LLP
ONE MARKET SPEAR STREET TOWER
SAN FRANCISCO, CA 94105

EXAMINER	
SMITH, CAROLYN L	

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1631	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/678,041	**Applicant(s)** SCHNEIDER, LUKE V.	
	Examiner Carolyn L. Smith	**Art Unit** 1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 February 2008*.
2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29 and 31-37* is/are pending in the application.
  4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-29 and 31-37* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  a)☐ All b)☐ Some * c)☐ None of:
    1.☐ Certified copies of the priority documents have been received.
    2.☐ Certified copies of the priority documents have been received in Application No. _____.
    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
  Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
  Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's amendments and remarks, filed 2/14/08, are acknowledged. Amended claims 1-2, 19, and 35-36 and cancelled claim 30 are acknowledged. Claims 14-18 remain withdrawn due to being drawn to non-elected subject matter. It is noted that the claim status identifier for claim 19 is incorrect; it should be "currently amended".

Applicant's arguments, filed 2/14/08, have been fully considered but they are not deemed to be persuasive. Rejections and/or objections not reiterated from the previous office actions are hereby withdrawn. The following rejections and/or objections are either reiterated or newly applied. They constitute the complete set presently being applied to the instant application.

Claims 1-13, 19-29, and 31-37 are herein under examination.

Claim Rejections – 35 USC §102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, 19-22, 27, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Laurikkala et al. (Computer Methods and Programs in Biomedicine, Vol. 55, 1998, pages 217-228). This rejection is maintained and reiterated for reasons of record.

Laurikkala et al. disclose using an algorithm that modifies an initial population of chromosomes with selection, crossover, and mutation operators including bit values and fitness is calculated and recalculated after applying crossover and mutations, and choosing the most fit chromosomes with a higher probability (page 218, col. 2, last paragraph to col. 219, col. 1, first paragraph) wherein the latter two operators are selected (page 220, col. 1, second paragraph and col. 2, fourth paragraph), discovers rules for an expert system from databases (abstract and Figure 1), using a PC architecture and Windows environment with Delphi, an object-oriented software development tool which allows quick application building with Object Pascal programming language (page 220, col. 2, second paragraph) which represents providing a plurality of unit operations (inherently stored in a computer) that represent one or more biological actions that can be performed on one or more components (chromosomes), and providing a first hypothetical model, as stated in steps a) and b) of instant claim 1. Laurikkala et al. disclose recording values of 15 parameters (page 219, col. 2, third paragraph). Laurikkala et al. disclose using Galactica, a genetics-based learning system including a simple genetic algorithm, via rule-based concepts including chromosomes processed with crossover and mutation operators as well as Michalski's concept learning operators to improve the learning process (page 220, col. 2, last three paragraphs and Figure 1) as well as using a platform of PC architecture and Windows (operating system) environment with Delphi, an object-oriented software development tool which allows quick application building with Object Pascal programming language (page 220, col. 2, second paragraph) which represents inherently using a computer as well as deriving and optimizing a mathematical model (as stated in the preamble of instant claim 1) as well as applying a first artificial intelligence algorithm to first hypothetical mathematical model to produce a second hypothetical mathematical model (as stated in step c) of instant claim 1) as well as memory (as stated in instant claim 19) and a genetic algorithm (as stated in instant claim 5). Laurikkala et al. disclose using elitism wherein the best member of each generation is moved intact into the new generation (page 220, col. 2, fourth paragraph) and using a fitness function with criteria of consistency, completeness, and complexity of the rule set wherein the function comprises a weighted factor to adjust an adjustable parameter in empirical data (page 220, col. 2, last paragraph; section 5.3; including equations 5.1 – 5.4) evaluating accuracy involving a learned rule set and testing examples (section 5.4 and Table 2 and Figure 1) and testing the system under conditions with different rules and carrying out discriminant analysis for comparison and model accuracy purposes (page 222, col. 2, last paragraph to page 223, col. 1, first paragraph and page 223, col. 2, third paragraph) which represents using a fitness function to determine which model best represents the system of instant claim 1; instant claims 2, 3, 27; and the analysis and comparison modules of instant claim 19. Laurikkala et al. disclose runs were made with each data set and the best result measured in terms of accuracy was selected to be reported (page 224, col. 1 first paragraph; Tables 3-5; section 7.4) which represents the communicating step in step e) of instant claim 1 and in steps c) and d) of instant claim 19. The modules of instant claim 19 are summarized in Figure 1 with rules representing a unit operations module and an interchange of rules with an expert system as well as the accuracy, learning set, fitness, and genetic algorithm representing the analysis and comparison modules. Laurikkala et al. disclose using Galactica, a machine learning system, with a PC architecture and Windows environment with Dephi software development tool with Object Pascal programming language (abstract and page 220, col. 2, second paragraph), using a genetic algorithm for the rule discovery from databases (page 218, col. 1, fourth paragraph), using GABIL and GIL systems (page 220, col. 1, second paragraph), and a statistical software package SPSS for Windows 6.1.3 (page 223, col. 2, third paragraph) which represents a computer, a CPU, and a memory communicating with a CPU, as stated in instant claim 19. Laurikkala et al. disclose iterating the genetic algorithm until a pre-determined stopping condition is attained resulting in recalculation of the fitness, selecting parents, and creating a new population (page 218, col. 2, last paragraph to 219, col. 1, first paragraph) using mathematical calculations for consistency, completeness, and complexity as well as accuracy (page 222, col. 1 and 2) which represents reiterating steps c) and d) to obtain alternative models and generating a global optimum solution comprising a mathematical model, as stated in instant claim 4. Laurikkala et al. disclose comparing experimental results of the system with those obtained with a discriminant analysis technique (page 218, col. 2, first paragraph and page 222, col. 2, last paragraph to page 223, col. 1, first paragraph), calculating fitness for each member of the population (page 218, col. 2, last paragraph) and modifying a population of chromosomes by simulating natural selection and choosing the most fit chromosomes (page 218, col. 2, last paragraph) which represents comparison to a first set of empirical data, as stated in instant claim 6. Laurikkala et al. disclose a set of differential display data points in Figure 3, as stated in instant claims 7 and 29. Laurikkala et al. disclose modeling immune systems (page 218, col. 1, third paragraph) which represents biological, biochemical, and physiological systems, as stated in instant claims 20-22.

Thus, Laurikkala et al. anticipate instant claims 1-7, 19-22, 27, and 29.

Applicant recites case law for an anticipation rejection under 35 U.S.C. § 102 to be proper, a single reference must disclose each and every element of a claim. Applicant summarizes the instant invention as well as Laurikkala et al. Applicant argues Laurikkala et al. does not disclose "unit operations" which are "actions that can be performed on one or more components of a system" and a "model comprising a subset of unit operations". This statement is found unpersuasive as the instant claim 1 can be read such that it is the "physical, chemical, or biological actions", and not the "unit operations", that can be performed on one or more components of a system. For example, modifying an initial population of chromosomes with selection, crossover, and mutation operators including bit values and choosing the most fit chromosomes with a higher probability (page 218, col. 2, last paragraph) represents unit operations (i.e. crossover, mutation) that can be performed on components (i.e. chromosome) of a system (i.e. genetic system). Crossovers and mutations represent subsets of unit operations. Applicant summarizes Laurikkala et al. and argues that although Laurikkala et al. use terms "chromosome" and "gene", these terms are not mathematical representations of any biological process. This statement is found unpersuasive as instant claim 1 recites "unit operations [...] that each mathematically represent one or more physical, chemical, or biological actions...". Laurikkala et al. disclose bit values of alleles of a gene, and a selection operator that simulates natural selection by choosing with a higher probability the most fit chromosomes (this is a mathematical representation), and then the crossover and mutation operators (i.e. biological processes) rearrange and generate new changes into the chromosome with fitness being calculated and then recalculated after changes which represent mathematical representations (page 218, col. 2, last paragraph to page 219, col. 1, first paragraph). Applicant argues that it is unclear what is considered to be "unit operations" in the Laurikkala et al. reference. It is noted that this phrase can be broadly and reasonably interpreted to be any of the suggestions mentioned by Applicant, especially the crossover and mutation operators. Applicant's arguments are deemed unpersuasive for the reasons given above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-8, 11-13, 19-29, 31-32, and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laurikkala et al. (Computer Methods and Programs in Biomedicine, Vol. 55, 1998, pages 217-228) further in view of Addison (US 2004/0143725 A1). This rejection is maintained and reiterated for reasons of record.

Laurikkala et al. describe the limitations of claims 1-7, 19-22, 27, and 29, as stated in the 35 USC 102 rejection above. Laurikkala et al. do not describe the differential gene expression data points, differential weather pattern points and system, differential traffic pattern points and system, differential financial market data points and system, differential equations, protein expression data points, antibody microarray experiments, and differential metabolite expression, as recited in instant claims 8, 11-13, 23-26, 28, 31-32, and 34-35.

Addison describes optimizing techniques and genetic programming techniques for mimicking the behavior of biological cells in complex systems via simulations and mathematical modeling using artificial intelligence (abstract, 0002-0003, 0025, 0033, 0052, 0155, Figure 2.3-2). Addison describes using differential equation models and using expression level data of genes, proteins, and metabolites (0033, 0225, 0280, Table 3.1.1-1, 0285, Table 3.1.2-1), as stated in instant claims 8, 26, 28, 31, 32, and 35. Addison describes using empirical optimization and models to understand tissues including immune system simulation, evolution, impact of mutations on disease, and understanding the proliferation of cancer and gene expression as well as comparisons and pattern recognitions of tissues (0762, 0061, 0127, 0179, 0588, 0591, 0769, and col. 49). Addison describes using differential equation models and simulating complex systems such as weather, the stock market, and the behavior of biological systems, molecular sensing, drug delivery (real or simulated), as well as antibody and microarray experiments (0033, 0113-0118, 0159, 0415, 0565, 0597, 0769) which represents differential weather, traffic (molecular), financial market data points and systems and antibody microarray experiments, as stated in instant claims 11-13, 23-25, and 34.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the artificial intelligence model method of Laurikkala et al. by simulating other complex systems such as those involving gene expression as taught by Addison (0062-0068) wherein the motivation would have been to avoid the laborious knowledge acquisition needed from human experts in expert systems by employing machine learning techniques that learn required knowledge automatically, as stated by Laurikkala et al. (page 217, col. 2). One of ordinary skill in the art would have expected success in making this modification as both references deal with applying artificial intelligence to complex systems and genetic programming techniques (Addison: abstract, 0002-0003, 0025, 0033, 0052, 0155 and Laurikkala et al.: abstract).

Thus, Laurikkala et al. in view of Addison make obvious instant claims 1-8, 11-13, 19-29, 31-32, and 34-35.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 9-10 and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laurikkala et al. (Computer Methods and Programs in Biomedicine, Vol. 55, 1998, pages 217-228) and Addison (US 2004/0143725 A1) as applied to claims 1-8, 11-13, 19-29, 31-32, and 34-35 above, and further in view of Hood et al. (US 2002/0095259 A1). This rejection is maintained and reiterated for reasons of record.

Laurikkala et al. and Addison describe the limitations of instant claims 1-8, 11-13, 19-29, 31-32, and 34-35, as described in the 35 USC 103 rejection above. Laurikkala et al. and Addison do not describe generating differential gene expression data points from cancerous tissue compared to normal tissue and cancerous tissue, such as from lung, as stated in instant claims 9-10 and 36-37.

Hood et al. describe using artificial intelligence methods (0098). Hood et al. describe generating gene expression data from cancerous tissue compared to normal tissue, including from lung (0025, 0150, 0228).

It would have been further obvious to a person of ordinary skill in the art at the time the invention was made to modify the artificial intelligence model methods of Laurikkala et al. and Addison by comparing models to gene expression data from healthy versus diseased specimens as taught by Hood et al. wherein the motivation would have been to generate a more effective, efficient, and accurate method based on changes in gene expression in various diseases since data mining learns and infers from large bodies of data and provides understanding for how to use a large data set for calculations for efficient and accurate diagnostic methods, as stated by Hood et al. (0005 and 0098). One of ordinary skill in the art would have expected success in making this modification as all references deal with applying artificial intelligence to complex systems (Addison: abstract, 0002-0003, 0025, 0033, 0052, 0155; Laurikkala et al.: abstract; and Hood et al.: 0098).

Thus, Laurikkala et al. in view of Addison and Hood et al. make obvious instant claims 1-13, 19-29, 31-32, and 34-37.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Laurikkala et al. (Computer Methods and Programs in Biomedicine, Vol. 55, 1998, pages 217-228) and Addison (US 2004/0143725 A1) as applied to claims 1-8, 11-13, 19-29, 31-32, and 34-35 above, and further in view of Cubicciotti (US 2002/0034757 A1). This rejection is maintained and reiterated for reasons of record.

Laurikkala et al. and Addison describe the limitations of instant claims 1-8, 11-13, 19-29, 31-32, and 34-35, as described in the 35 USC 103 rejection above. Laurikkala et al. and Addison do not describe obtaining data from stable isotope mass spectrometric tagging experiments, as stated in instant claim 33.

Cubicciotti describe using artificial intelligence and using stable isotope tags and mass spectroscopy techniques (0008, 0274, 0276, 0358, 0421, 0450, 0470, 0485, 0563, 0612, 0631).

Cubicciotti states efforts to simulate the productivity and efficiency of biomolecular machinery have been only marginally successful because of the inability to recreate the structural organization of molecules and groups of molecules inherent in highly ordered biological systems (0003). It would have been further obvious to a person of ordinary skill in the art at the time the invention was made to modify the artificial intelligence model methods of Laurikkala et al. and Addison by comparing models to data from mass spectrometric tagging experiments as taught by Cubicciotti wherein the motivation would have been to select and identify target-binding molecules with desirable properties in pharmaceuticals wherein the designed, selected, manufactured, modified or engineered molecules are capable of functioning as replacements, alternatives, upgrades, improvements, structural analogs or functional analogs to natural, synthetic, selectable or biological molecules via coupling machine intelligence to a process, domain or system, such that data and/or information are effectively comprehended in a usefully timely manner, as stated by Cubicciotti (abstract, 0159, 0323). One of ordinary skill in the art would have expected success in making this modification as all references deal with applying artificial intelligence to complex systems (Addison: abstract, 0002-0003, 0025, 0033, 0052, 0155; Laurikkala et al.: abstract; and Cubicciotti: 0144, 0323, 0421).

Thus, Laurikkala et al. in view of Addison and Cubicciotti make obvious instant claims 1-8, 11-13, 19-29, and 31-35.

Applicant states when rejecting claims under 35 USC 103, the Examiner bears the burden of establishing a prima facie case of obviousness and cites case law. Applicant again argues that Laurikkala et al. fail to teach the limitation “unit operations” which are "actions that can be performed on one or more components of a system” and a “model comprising a subset of unit operations”. Applicant further argues this defect is not cured by Addison, Hood, or Cubicciotti which are all summarized. This statement is found unpersuasive as Laurikkala et al. disclose these limitations as already discussed in the 35 USC 102 rebuttal above. Applicant again argues that the prior art references do not relate to "unit operations" which has already been found unpersuasive. Applicant further argues that because this limitation is lacking, there is no apparent reason to combine the references. This statement is found unpersuasive as the limitation is not lacking and motivational statements for reasons to combine references have been made at the end of each 35 USC 103 rejection. Applicant argues that the motivational statement for combining Laurikkala et al. and Addison is insufficient because the “artificial intelligence" used by Addison is not an expert system. This statement is found unpersuasive as an expert system is a traditional application and/or subfield of artificial intelligence. Addison describes the ability of expert systems to work in his invention (0654-0662). Applicant's arguments are deemed unpersuasive for the reasons given above.

Applicant has made a request for an interview. Applicant's representative may call the Examiner at the phone number given below to set up an interview.

Conclusion

No claim is allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Papers related to this application may be submitted to Technical Center 1600 by facsimile transmission. Papers should be faxed to Technical Center 1600 via the PTO Fax Center. The faxing of such papers must conform with the notices published in the Official Gazette, 1096 OG

30 (November 15, 1988), 1156 OG 61 (November 16, 1993), and 1157 OG 94 (December 28, 1993) (See 37 CFR §1.6(d)). The Central Fax Center number for official correspondence is (571) 273-8300.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carolyn Smith, whose telephone number is (571) 272-0721. The examiner can normally be reached Monday through Thursday from 8 A.M. to 6:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran, can be reached on (571) 272-0720.

May 15, 2008

/Carolyn Smith/
Primary Examiner
AU 1631